

IN THE UNITED STATES DISTRICT COURT FOR THE
NORTHERN DISTRICT OF OKLAHOMA

(1) DENNIS R. CORNWELL, Individually,)
and as Personal Representative)
of the Estate of RENIA A. CORNWELL,)
Deceased,)

Plaintiff,)

v.)
(1) UNION PACIFIC RAILROAD CO.,)
a Delaware Corporation,)

Defendant.)

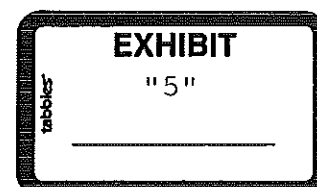
CASE NO. 08-CV-638-JHP-TLW
JUDGE JAMES H. PAYNE

DECLARATION OF MICHAEL KEANE, P.E.

1. My name is Michael Keane. I am President of Keane Acoustics and a licensed professional engineer the States of New York and Florida. My curriculum vitae is attached hereto (Ex. 1). I have been retained by the Plaintiff in this matter and requested to analyze the sound portion of a recording taken from a video recorder aboard the locomotive that was involved with the subject accident. A copy of said video recording is attached hereto on DVD (Ex. 2).

2. I was provided a copy of an affidavit executed by Michael Fann, an acoustical engineer retained by the Defendant. Mr. Fann opines in his affidavit regarding the microphone for the video recorder, which was on the locomotive with the designation UP 8130, which was allegedly the lead locomotive of the train involved with the collision which is the subject of this action. Mr. Fann opines that said microphone was "saturated" due to vibrations resulting from a metal to metal contact of the microphone with parts of the train and/or vibrations resulting from the microphone not being adequately isolated from the train.

3. I have analyzed the sound of the video from UP 8130 using Fast Fourier Transform methodology where by computer I can see the sound frequency spectrum of the sound on the video in real time. If there had been such "saturation" as Mr. Fann describes one would expect to see evidence that the full recording or at least some substantial portion of the recording would be distorted



from "saturation". There is no supporting evidence from listening to the recording or analyzing the frequency spectrum that this degree of distortion was present. Certainly, in order to explain the lack of a distinct whistle (horn) sound for the time period a whistle (horn) is normally sounded, one would expect such alleged saturation to occur for the entire time period that such whistle (horn) would normally sound. However, there is no audible evidence from the sound recording and no evidence from the analysis of the sound frequency spectrum that severe microphone saturation or distortion occurred for any such period of time, with the exception of the collision in which the audio waveform appears noticeably "clipped" or truncated. Train events such as braking, rolling over a small bridge or rail discontinuities cause the overall level of sound to increase and decrease independent of the 440 Hz and associated tones. The audio waveform does not appear noticeably clipped at any other time. This supports my opinion that the microphone was not "saturated" as claimed by Michael Fann in his affidavit.

4. Mr. Fann states in his affidavit that "The sound on the TIR video ...is at a pitch of approximately 440 Hz which is similar to the pitch of a train horn." Mr. Fann further opines that such 440 Hz pitch "...is more likely associated with the operation of the locomotive, more specifically the repetition rate of locomotive UP 8130's pistons." It is not clear why Mr. Fann offers this opinion. However, if Mr. Fann is suggesting that the horn (whistle) is in some way masked by the sound of the "repetition rate of locomotive UP 8130's pistons," that is clearly not possible.

5. A locomotive's whistle (horn) is in most all cases either a 3 or 5 chime instrument tuned to a musical chord. As a musical instrument, no one whistle (horn) operates at a single pitch or single frequency. Instead each whistle (horn) operates at many varied pitches and frequencies where each chime operates at a different fundamental pitch, including integer multiples of the fundamental pitch frequency. Therefore, it is highly unlikely that there would be any one sound source or combination of sound sources that could entirely mask the whistle (horn) because any such other sound source would have to be tuned to operate on all the exact frequencies and pitches of said whistle (horn). No sound of a whistle (horn) or portion of the sound of a whistle (horn) is heard prior to the collision on the sound portion of the video.

6. I went onto the web site of Union Pacific Railroad and found a web page that discusses the video system of the type which was contained on locomotive UP 8130. The link for said web page is

http://www.uprr.com/newsinfo/releases/safety/2008/0128_tir.shtml . A copy of said web page has been printed and is attached hereto (Ex.3). Said web page, referring to video recorders of the type contained on locomotive UP 8130, states as follows: "A microphone is mounted outside to record the locomotive's air horn and bell." Therefore, notwithstanding the fact that the microphone is located, according to Michael Fann, "in an airbrake cabinet which is attached to the underside of the locomotive under the floor below the engineer's seat," the microphone is outside the locomotive and is intended to record the sound of the whistle (horn).

7. I also downloaded from the above referenced web page, a video recording with sound recorded by a video recorder aboard a Union Pacific train which was recorded while the locomotive was moving down the railroad tracks sounding its whistle (horn). Such video downloaded from such web site is attached (Ex. 4). I analyzed the sound from this video using the same methodology as described above for the video from UP 8130. This video provided me with sounds of an operating locomotive while its whistle (horn) was sounding. The sound of the whistle (horn) was one of the dominant sounds on the recording, contrary to what Mr. Fann states in his affidavit. I was able to see through FFT analysis the frequency spectra associated with the sound of the whistle (horn) on this web site video and also the frequency spectra of the sounds similar to those Mr. Fann attributes to the operation of the locomotive. This "operational" sound did record at 440 Hz, and multiples thereof (880 Hz, 1320 Hz, etc.), which were not at the same pitch frequencies of the train whistle (horn).

8. Therefore, it is my opinion, based upon my education, training and experience and the testing I have conducted in this matter, that there was no severe microphone saturation or distortion that would prevent one from clearly hearing the sound of the whistle (horn) of locomotive 8130 on the sound portion of the video recording. Further, it is my opinion that there is nothing else that would have masked the sound of the whistle (horn) on the sound recording of the TIR video from locomotive 8130, and that if the whistle (horn) had been sounded by locomotive UP 8130 at any time during such recording it would be detectable via FFT analysis and it would be highly likely it would be audible.

9. Mr. Fann seems to suggest in his affidavit that the reason the whistle (horn) is not heard on the video from locomotive UP 8130 is because of saturation of the microphone from operational vibrations yet states that a

stationary locomotive inspection would be sufficient to reveal all such operational vibrations. If a stationary inspection were the only inspection to take place, Union Pacific would then be free to argue later that there must be vibrations that occur when the locomotive is moving at speeds up to 42 mph (the speed of the locomotive at the time of the subject collision) which saturates the microphone or masks the sounds of the whistle (horn) on the audio recording, and that such vibrations were not present at the time of the stationary inspection.

10. It is my opinion that an inspection as set out in Plaintiff's Response and Brief in Support Thereof in Opposition to the Defendant's Motion for Protective Order and Plaintiff's Motion to Compel Inspection of Locomotive would best demonstrate to the jury what a train whistle (horn) sounds like on locomotive 8130's video recorder with all of the vibrations and sound frequencies that occur while such locomotive and rail cars are operating at a speed of 42 mph (give or take 5 mph). It is further my opinion that the whistle (horn) of locomotive 8130 did not sound prior to the subject collision at any time during the video recording.

I declare, certify, verify and state under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Dated this 12 day of November, 2009.



Michael Keane. P.E.



CREDENTIALS

Michael has been providing acoustical consulting services since 1999 covering a wide range of domestic and international projects including Residential, Hospitality, Education, Arts, Worship, Commercial, Transportation and Athletic Facilities. His technical background includes the following:

- ❖ B.S. Electrical Engineering
- ❖ Master's Studies in Music Engineering Technology
- ❖ Licensed Professional Engineer in the States of Florida and New York

Graduate level coursework covered topics such as Psychoacoustics, Psychology of Music, Acoustics, Transducer Theory, Digital Audio Theory and Analysis, Perceptual Coding, and Audio Digital Signal Processing.

Michael has a high level of experience in architectural acoustics, electro-acoustics, and mechanical services noise and vibration.

Michael is highly skilled in a number of acoustical analysis and modeling applications, including intelligibility and reverberation time modeling, environmental noise modeling, and on-site noise, vibration, reverberation time and intelligibility assessment.

PROFESSIONAL ASSOCIATIONS

- Acoustical Society of America
- American Society for Testing and Materials (ASTM) Member E33 committee on Environmental Acoustics
- Audio Engineering Society
- Florida Engineering Society
- National Society of Professional Engineers
- National Council of Acoustical Consultants

SERVICES OFFERED

ARCHITECTURAL / ENGINEERING ACOUSTICAL DESIGN

Residential
Hospitality
Education
Arts
Worship
Commercial
Transportation
Residential
Stadia
Hospitals

ELECTRO-ACOUSTICAL DESIGN

Public Address Systems
Voice Alarm Systems
Program Audio Systems

TESTING/ANALYSIS AND TROUBLESHOOTING

Noise Code Compliance
Reverberation
Sound Isolation /
Transmission
Vibration
Speech Intelligibility
Mechanical Services Noise
and Vibration Mitigation

ENVIRONMENTAL ACOUSTICS

EXPERT WITNESS

SELECTED PROJECTS

Michael's career experience encompasses projects small and large. He has been responsible for the design and commissioning of multi-million dollar acoustical and audio systems. Selected projects include:

Residential/Hospitality

Fontainebleau Resort, Miami Beach, FL
Private Residence, New York, NY
Mansion by the Seas Condominium,
Treasure Island, FL
Soho Standard Hotel, New York, NY
Beacon on Third Condominium, St.
Petersburg, FL
Element Hotel, Tampa, FL
Private Residence, Sarasota, FL

Michael Keane President

4764 Stoneview Circle
Oldsmar, FL 34677
727.644.3445
keaneacoustics@aol.com

Educational

MIT Simmons Hall, Cambridge, MA
Cornell University West Campus, Ithaca,
NY
UWI Lecture Theater, Port of Spain,
Trinidad and Tobago
Jacobson Culinary Arts Academy, Tarpon
Springs, FL
SUNY Purchase Music School, Purchase,
NY

Arts/Cultural

Charlottesville Amphitheater, VA
Austrian Cultural Forum, New York NY
Salt Lake City Library, Salt Lake City, UT
Art Institute of Chicago, Chicago, Illinois
National Cultural and Arts Centre, Trinidad
and Tobago
Muhammad Ali Center, Louisville, KY
Peabody Essex Museum, Salem, MA
Miller Theater, Columbia University, NY
Davenport Museum of Art, Iowa

Worship

Congregation Beth Shalom, Clearwater, FL
St. Jerome Parish, Indian Rocks, FL
Peace Memorial Church, Clearwater, FL
First Christian Church of Tarpon Springs,
FL
St. Anne Catholic Church, Ruskin, FL
Tampa Covenant Church

Commercial

International Plaza, Tampa, FL
Grimshaw Architects, New York, NY
One Liberty Plaza, New York, NY
Great Plains Software, Fargo, ND
Razor and Tie Records, New York, NY

Transportation

Terminals 4, 5, 6, and 7 at JFK
International Airport, New York, NY
Pearson International Airport, Toronto
Dulles Int'l Airport, Washington D.C.
Los Angeles International Airport, CA
Newark Liberty International Airport, NJ
Miami International Airport, Miami, FL
Fulton Street Transit Center, New York, NY
Second Avenue Subway, New York, NY

Stadia/Athletics

Liverpool New Anfield Stadium, Liverpool,
UK
Hudson River Park Pier 40, New York, NY
University of Cincinnati Athletic Center,
Cincinnati, OH

EXHIBIT

"1"

EXHIBIT “2” to the Declaration of Michael Keane, P.E.

The Video Recording Referenced in the Declaration is under the Protective Order of this Court. It was previously filed Under Seal on November 20, 2009 and is reflected in the Court’s February 2, 2010 Docket Entry No. 106.

http://www.uprr.com/news/releases/2008/0128_01.shtml

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UP: Nearly 90 Percent of Union Pacific's Road Locomotives...

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UNION PACIFIC

EXHIBIT "3"

News Releases

Capital Investment
Community
Environment
Financial
General
Heritage & Steam
Human Resources
Safety
Service
All News Releases
TIRs
Report Emergencies
Contact UP Police
1-888-877-7267

Nearly 90 Percent of Union Pacific's Road Locomotives to Have Cameras by End of 2008

Digital Camera Technology Installed on Locomotives to Enhance Public Safety

Omaha, Neb., January 28, 2008 – Union Pacific this year plans to install more than 1,600 Track Image Recorders (TIRs) aboard locomotive cabs to digitally record a view of the track, crossings and signals directly in front of a train as it travels over the rails.

"Installation of TIR equipment is another step in Union Pacific's commitment to employee and public safety," said Bob Grimalta, vice president-safety and environment. "This equipment is a valuable tool in assisting with the investigations of pedestrian or grade-crossing incidents."

UP began installing TIRs in 2005 and has more than 4,000 locomotives equipped with TIRs out of their over-the-road locomotive fleet of more than 6,000 locomotives. More than 85 percent of Union Pacific's road freight trains now have a TIR equipped locomotive in the lead.

A small camera is mounted inside the locomotive cab, looking down the track providing the train crew's point of view. A microphone is mounted outside to record the locomotive's air horn and bell. The video image disk can record up to five days of information.

TIR video images and locomotive event recorder data can be synchronized to provide detailed information about what occurred prior to an incident.

"Now when a train crew gets on board a locomotive and they see a TIR camera, they know that technology is there to help us help them to have a safer trip," said Grimalta.

About Union Pacific

Union Pacific Corporation owns one of America's leading transportation companies. Its principal operating company, Union Pacific Railroad, links 23 states in the western two-thirds of the country and serves the fastest-growing U.S. population centers. Union Pacific's diversified business mix includes Agricultural Products, Automobiles, Chemicals, Energy, Industrial Products and Intermodal. The railroad offers competitive long-haul routes from all major West Coast and Gulf Coast ports to eastern gateways. Union Pacific connects with Canada's rail systems and is the only railroad serving all six major gateways to Mexico, making it North America's premier rail franchise.

For further information, contact Mark Davis at (402) 544-5459.

A BETA SP videotape copy of this near-hit taken by a TIR is available on request from Mark Davis at the above telephone number.

The statements and information contained in the news releases provided by Union Pacific speak only as of the date issued. Such information by its nature may become outdated, and investors should not assume that the statements and information contained in Union Pacific's news releases remain current after the date issued. Union Pacific makes no commitment, and disclaims any duty, to update any of this information.

TRACK IMAGE RECORDERS



View Larger
(24K JPEG file)

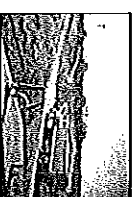
Download
(5875K PDF file)
A small video camera, mounted inside the locomotive cab on one of Union Pacific's more than 6,000 over-the-road locomotives, looks down the track providing the train crew's point of view and has become a valuable tool in assisting with the investigations of pedestrian or grade-crossing incidents.

NEAR-HIT VIDEO

View Footage
For broadcast purposes, a BETA SP videotape copy of this near-hit is available on request from Mark Davis at the telephone number below.



1
(173K JPEG file)



2
(174K JPEG file)

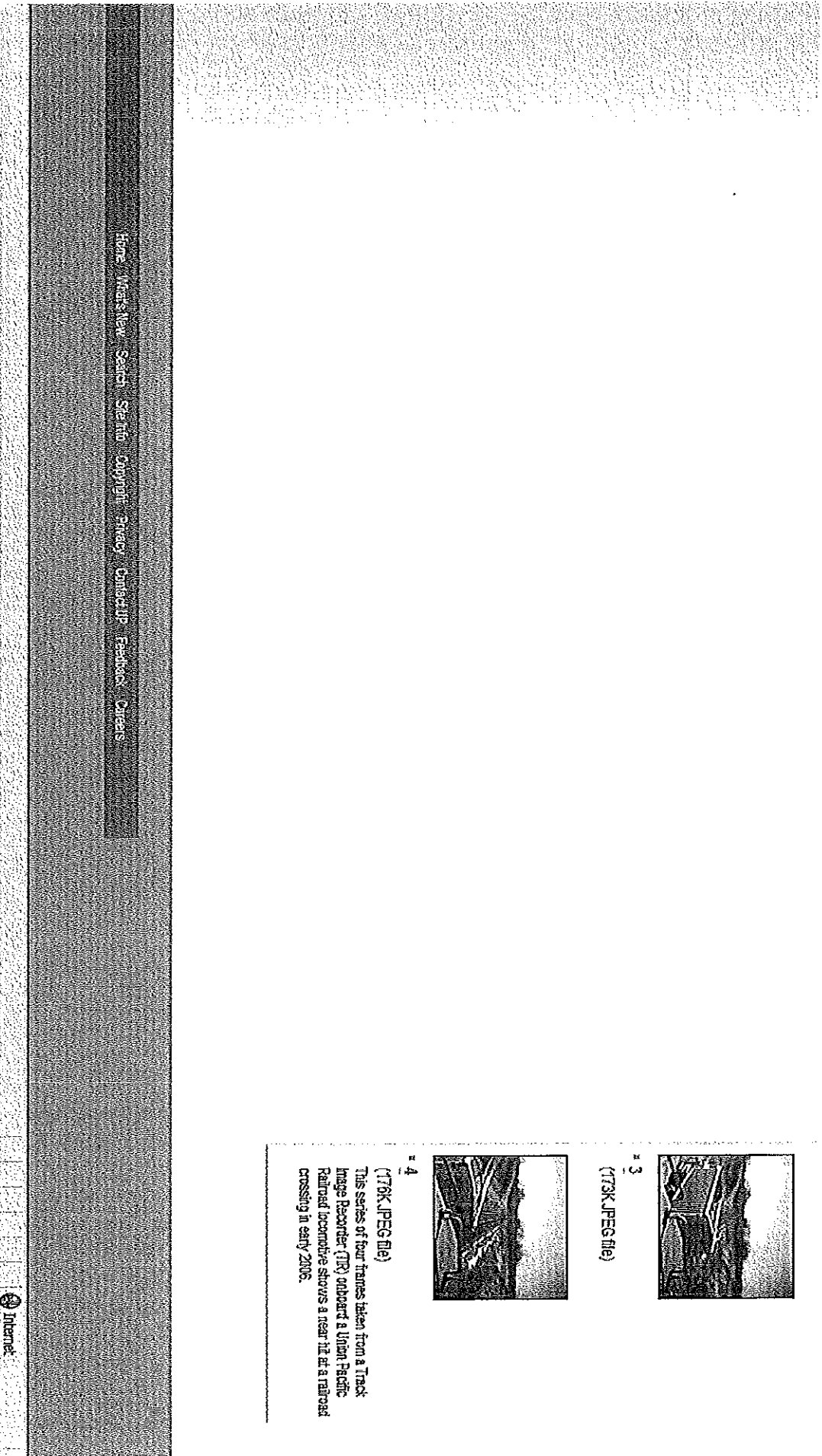
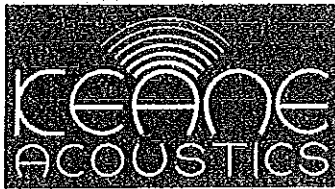


EXHIBIT “4” to the Declaration of Michael Keane, P.E.

The Video Recording Referenced in the Declaration is not amenable to electronic filing and was previously filed conventionally on November 20, 2009 and is reflected in the Court’s Docket Entry No. 70.



November 29, 2009

John Merritt, Attorney
Merritt & Associates, P.C.
917 N. Robinson
Oklahoma City, Oklahoma 73102

Mr. Merritt,

The declaration attached hereto, executed on November 12, 2009, shall serve as my expert report herein.

My estimate of potential future charges which could be incurred for work I might be called upon to do in the above matter is \$15,000.

I have been deposed in the following matter:

Deposition 7/16/08, Don Kiser et al. v CSX Real Property, Inc., et al., Case No. 8:07-cv-01266-SCB-EAJ, Middle District of Florida, Tampa Division.

Deposition 9/11/08, Don Kiser et al. v CSX Real Property, Inc., et al., Case No. 8:07-cv-01266-SCB-EAJ, Middle District of Florida, Tampa Division.

I have not authored any publications in the last 10 years.

Sincerely,

A handwritten signature in black ink, appearing to be "M. Keane", written in a cursive, flowing style.

Michael Keane
President and Principal Consultant
Keane Acoustics Inc.